DENTAL ECONOMICS®

DENTAL UNIT WATER LINES: FROM INFERENTIAL TO DOCUMENTED EVIDENCE

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Since the first report describing bacterial colonization of dental water delivery systems by Blake in 1963, numerous subsequent articles have documented the routine presence of high concentrations of microorganisms in dental water lines. Many of these have also investigated approaches to controlling microbial accumulation. Previously documented scientific and clinical evidence describing waterborne infections and disease in hospital settings that were traced to contaminated water sources have remained as the basic rationale for dental water studies. Devices associated with hospital-acquired infections have included nebulizers, endoscopes, and hemodialysis units. Yet, despite the efforts of researchers, clinicians, and epidemiologists since 1963, definitive evidence confirming waterborne bacteria as the etiology of dental post-treatment or occupationally acquired infection has been difficult to demonstrate.

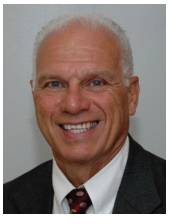
This is exemplified by the fact that, while research continued to find that the water produced from dental units contained high levels of bacteria (1,000 to 1,000,000 cfu/mL), only a few investigations provided an inferential association between dental waterborne organisms and human infection. These included two independent studies reporting higher antibody titers against *Legionella* in sera of dental personnel compared to demographically similar control populations. Researchers thought this immune response was caused by chronic occupational exposure to *Legionella*-contaminated aerosols generated from dental units. Another investigation implicated contaminated dental water as the source of localized *Pseudomonas* infections in two immune compromised patients, along with 78 other individuals found to be carriers of the same bacterial strain. Review of case records, however, failed to find any infections in healthy dental patients traced back to contaminated dental water.

Earlier this year, the issue regarding dental water contamination and possible cross-infection moved from inference to documentation. A case report published in the Feb. 18, 2012, issue of *The Lancet* described the first documented instance of a dental patient contracting Legionnaires' disease from water used during treatment. The patient was an 82-year-old woman who had developed fever and respiratory symptoms after dental treatment appointments. She was diagnosed with Legionnaires' disease following admission to a hospital and subsequently died from fulminant respiratory disease and irreversible septic shock caused by *Legionella pneumophila*. Three different typing methods confirmed the clonal relation between *Legionella pneumophila* serogroup isolated from the dental handpiece water line and the patient's bronchial aspirate.

This tragic case further reinforces the importance of ongoing efforts of the health-care professions to implement and utilize effective infection control precautions during the provision of patient care. Human infections caused by waterborne microorganisms such as *Legionella pneumophila* have been described over a number of years in municipal, personal, and health-care environments. The maze of small-bore plastic tubing that delivers water in a dental unit offers an optimal environment for the proliferation of complex microbial populations known collectively as biofilm.

Fortunately, a number of strategies are available to the profession for controlling the growth of waterborne organisms and the development of complex biofilms. Although there are a number of available products with antimicrobial properties that are able to control microbial growth, initial removal of large numbers of attached contaminants by cleaning the lines remains an essential first step in reducing the potential for microbial cross-contamination. Use of dental water asepsis systems that incorporate periodic line-cleaning procedures with routine daily treatment of the water supply can provide an effective approach. Conscientious use of a complete infection-control system to treat dental water can minimize or prevent organisms from attaching, colonizing, and proliferating on the inner surfaces of the tubing. **DE**

References available upon request.



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